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AUTHOR Engelbrecht, Nancy; And Others
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ABSTRACT

These instructional materials provide an orientation to the pedestal grinder for use at the postsecondary level. The first of eight sections defines 14 important terms. The second section outlines 16 rules for safe use of the pedestal grinder. The third section covers grinding wheels for five different types of materials. The fourth section outlines five different compositions of grinding wheels. The fifth section reviews factors in the care and storage of grinding wheels. The sixth section describes grinding problems, possible causes, and suggested corrections. The seventh section reviews five pedestal grinder operations. The eighth section outlines the following pedestal grinder activities: (1) check new grinding wheel for cracks; (2) replace grinding wheel; (3) dress grinding; (4) grind high speed tool bit; and (5) grind drill bit. Tools, equipment, and procedures lists are provided for each activity. Illustrations are provided throughout the text. A quiz is included after the sixth section. The answer sheet is included at the end of this guide. (NLA)

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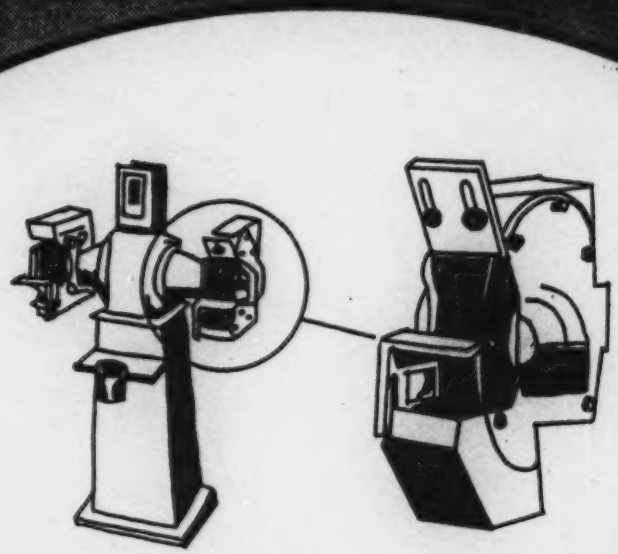
PEDESTAL GRINDER



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Name

CE056777

Project Director
Ron Vorderstrasse

Project Secretary
Jan Wisialowski

Technical Consultant
Leon Finecy

Technical Writers
Nancy Engelbrecht
Lynne Graf
Stacey Oakes

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PEDESTAL GRINDER

I. Pedestal Grinder

- A. Terms and definitions
- B. Safe use of the pedestal grinder
- C. Grinding wheels for different materials
- D. Composition of grinding wheels
- E. Care and storage of grinding wheels
- F. Grinding problems, possible causes, and corrections
- G. Pedestal grinder operations

PEDESTAL GRINDER ACTIVITIES

I. Check New Grinding Wheel for Cracks

II. Replace Grinding Wheel

III. Dress Grinding

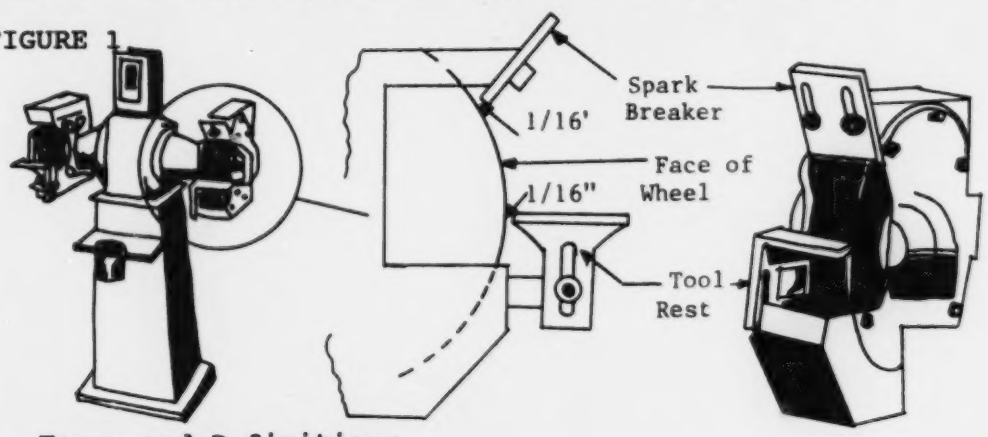
IV. Grind High Speed Tool Bit

V. Grind Drill Bit

I. PEDESTAL GRINDER

When mounting a new grinding wheel, the side guard and tool rest must first be removed and then the old wheel is removed. A piece of wood is used to keep the wheel from rotating. Next, remove the nut and then remove the wheel and blotters. A new wheel should be ring-tested before being put on the grinder. When ring testing a wheel, place a wooden dowel or metal rod on it and tap with the handle of a plastic screw driver. A clear ring will indicate that the wheel is safe to use. If a dull thud is heard, the wheel may have a crack and should not be used. After cleaning the spindle and flanges, the proper bushing is put on the spindle. Place a clean blotter on each side of the wheel between the wheel and the flange. Hold the wheel with a piece of wood and tighten the spindle nut firmly. Be careful not to over-tighten as it could break the wheel. Now, put the side guard and tool rest back in place.

FIGURE 1



A. Terms and Definitions

1. Face of grinding wheel--The outside circumference of a grinding wheel.

2. Glazing--Condition of grinding wheel face where sharp cutting surface has been worn smooth.

3. Loaded--Pores of the grinding wheel have become filled with particles of material being ground.

4. Abrasive--The cutting agent of a grinding wheel.

5. Grain--Size of the abrasive.

6. Grade--The strength of the bonding agent holding the wheel together; allows the wheel to wear.

7. Structure--Number describing the spacing of the abrasive.

8. Bond--Type of material used to hold the wheel together.

9. Trueing--Making wheel circumference true to its center.

10. Dressing--Making new, sharp cutting agents on the face of the wheel by removing worn surface.

11. Ringing--Checking grinding wheel for cracks.

12. Burn--Tool is too hot and will lose its temper.

13. Arbor--A shaft or spindle used to hold a revolving cutting tool or work to be cut.

14. Honing--Removing the wire edge with a fine abrasive stone after a tool has been ground.

B. Safe Use of the Pedestal Grinder

1. Stand to one side until grinding wheel has reached its maximum rpm.

   (NOTE: If the grinding wheel is going to fly apart, it will do so when first turned on.)

2. The tool rest and spark breaker should be set at a maximum 1/16" from face of grinding wheel.

   (NOTE: Never set tool rest or spark breaker while wheel is turning.)

3. Never wear gloves when operating the pedestal grinder.

   (NOTE: Most tools that are ground are small; gloves can be easily grabbed by the stone and pulled in, causing fingers to be injured.)

4. Wear a face shield or goggles over safety glasses when using the grinder.

FIGURE 2 Goggles

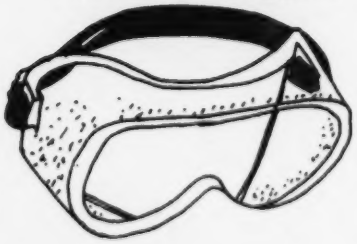
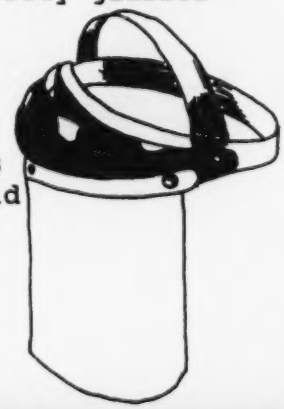


FIGURE 3
Face Shield



5. A respirator should be worn for protection during prolonged use of the pedestal grinder.

FIGURE 4

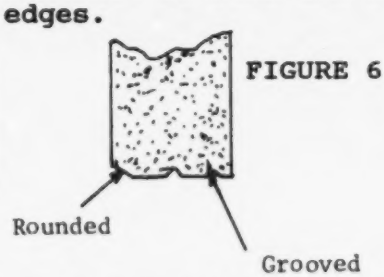
6. If excessive vibration occurs; stop grinder by turning off power, and move out of line of the grinding wheel until wheel has stopped.

   (NOTE: This may be a danger signal that the wheel is loose on the spindle or out of balance due to a nick; the wheel may explode.)

7. Face of grinding wheel must be flat and free of grooves or rounded edges.

FIGURE 5

FIGURE 6

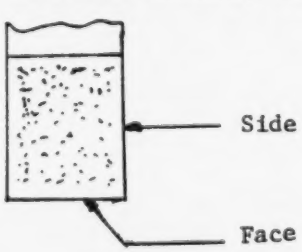


8. Pressure or force should never be used when feeding work into the machine.

   (NOTE: Too much pressure will cause excessive heat in the part; if the work slips off the wheel you could jam your hand into the wheel, causing injury.)

9. Never grind on the side of the wheel; the wheel's strength is located inward, from face to center.

FIGURE 7



10. Non-ferrous materials such as: brass, aluminum, copper, wood, plastic and other such materials should never be ground on a pedestal grinder.

(NOTE: Materials in the non-ferrous class will load the pores of the wheel, causing it to be ineffective for grinding.)

11. Glazing means that a sharp point of the abrasive has become dull and requires more pressure to cut.

    (NOTE: This will cause excessive heat to be transmitted to the part.)

12. Glazed or loaded wheel means that the wheel needs to be clean and sharp to be an effective cutting tool.

13. Never try to repair electrical switches; if the grinder does not work, notify the instructor.

14. The tool or part being ground is hot. Do not touch.

15. Never operate a grinder with guards removed.

16. Horse-play can cause injury. Never play around machinery.

C. Grinding wheels for different materials.

(NOTE: Grinding wheels in this unit are those used on bench and pedestal grinders.)

1. To grind a lathe tool or sharpen a tool made of high-speed steel - -

   a. Rough grind with an aluminum oxide coarse wheel.

      Example: 32A36-H8VBE

   b. Finish grind or sharpen with a fine aluminum oxide wheel.

      Example: 32A60-H8VBE

2. To sharpen a high-speed drill use a fine aluminum oxide wheel - -

   Example: 32A60-H8VBE

3. To grind cast iron - -

   a. Rough grind or coarse grind with a medium hard, coarse grain silicon carbide wheel.

      Example: 37C20-H8VK

b. Finish grind with a medium hard, medium grain silicon carbide wheel.

Example: 37C46-H8VK

4. To grind hardened tool steel use a wheel made of aluminum oxide - -

5. To grind carbide tool steel - -

a. Rough grind with a coarse silicon carbide wheel.

b. Sharpen or finish grind with a fine silicon carbide wheel.

Example: 39C60-18VK

(NOTE: It is recommended that grinding of carbide be done on a grinder that uses metal-backed grinding wheels and has a protractor that slides in guides on a tilt table.)

D. Composition of grinding wheels

(NOTE: Different manufacturers use different numbering systems to designate the composition of grinding wheels.)

1. Type of abrasive--Material in the grinding wheel that acts as the cutting agent; designated with numbers and letters, with the letters identifying the main base: a=alundum or aluminum oxide; c=silicon carbide or crystolon; d=diamond.

Example: 32A=Aluminum Oxide

2. Grain or grit--Size of the abrasive, expressed as a number from 10 (coarse) to 600 (very fine).

Examples: 32A 16, 32A 36, 32A 80, 32 400
coarse medium fine very fine

3. Grade--The strength of the bond holding the wheel abrasive together; determines the rate of which the wheel will break down; designated by letters from A (soft) to Z (hard).

Examples: 32A 36-D, 32A36-J, 32A 36-R
soft medium hard

4. Structure--The grain spacing, designated by a number from 1 to 12; the higher the number, the more "open" the structure. Examples:

FIGURE 8 32A35-H10

Abrasives are close together

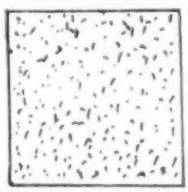
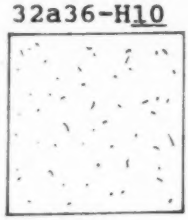


FIGURE 9 32a36-H10

Abrasives are far apart



5. Bond--The material that holds the abrasive together; is designated by a letter or letters.

E. Care and storage of grinding wheels

1. Trueing--New wheels mounted for the first time need to be trued, making the center concentric to the circumference.

2. Dressing--A grinding wheel is dressed to improve or alter its cutting action. Dressing removes dull abrasive grains and any foreign material that the wheel may have picked up and exposes sharp new abrasive grains.

3. Paper washers or blotters--Used to compensate for any unevenness in the thickness of the grinding wheel and must always be used.

4. Tightening--Never over-tighten the nut that holds the wheel because the wheel could crack.

5. Ringing--Checking the wheel for cracks; if a wheel is cracked it will not ring clear.

   (NOTE: This is done when putting on a new wheel or when a wheel has been damaged.)

6. Storing thin wheels--It is recommended that all thin wheels be stored flat with cardboard between each and in a cool place (60-80°F).

7. Balancing large wheels--Wheels 10" or larger must be balanced on the spindle or hub before mounting.

8. Starting large wheels--Start and stop large wheels several times to allow the wheels to gain speed slowly.

9. Speed--Never turn a grinding wheel faster than the speed marked on the wheel.

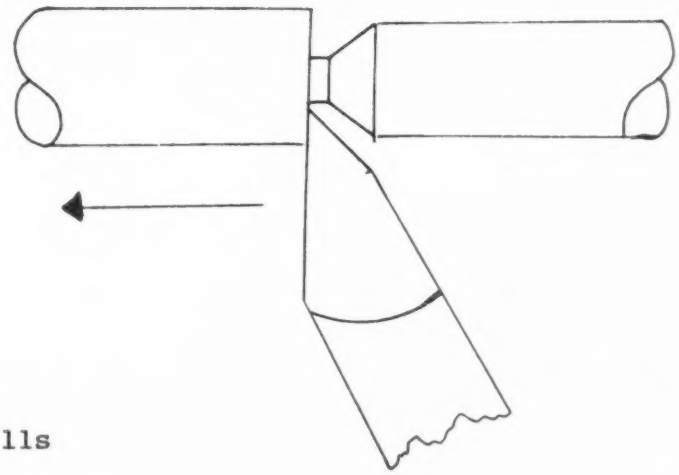
F. Grinding problems, possible causes, and corrections.

PROBLEM	POSSIBLE CAUSES	SUGGESTED CORRECTION
1. Burning of workpiece	Not enough pressure Wheel is too hard Wheel's face is loaded	Increase amount of pressure or reduce contact area Use softer grade and/or coarser grit wheel Dress to open wheel face
2. Wheel slows or stalls	Pressure is to high Belt slippage Wheel is too hard	Reduce pressure or reduce contact area Adjust and retighten belts Use softer grade and/or coarser grit wheel
3. Wheel corner breakdown	Wheel is too coarse Spindle is worn Wheel is too soft	Use finer grit wheel Check spindle run out and correct Use harder grade wheel

G. Pedestal Grinder Operations

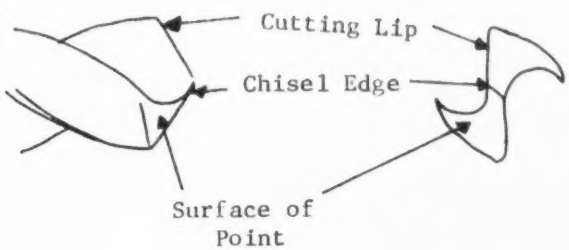
1. Grind lathe or sharpen tool to shape.

FIGURE 10



2. Sharpen drills

FIGURE 11



3. Grind parts to shape
4. Deburr parts
5. Clean up welds

QUESTIONS--PEDESTAL GRINDERS

1. Why must the tool rest be set to a maximum of 1/16" from the grinding wheel?

2. What is the purpose of ring testing a grinding wheel?

3. Why is it important not to grind on the side of the wheel?

4. What needs to be done when a grinding wheel becomes glazed or loaded?

5. What types of materials load up a grinding wheel and are suggested not to be used on a pedestal grinder:

6. How can tools that are ground on a pedestal grinder be cooled when they become too hot to hold?

7. Write the meaning of the following components of the grinding wheel:

   a) Type of abrasive_____

   b) Grain_____

   c) Grade_____

   d) Structure_____

   e) Bond_____

8. Interpret the composition of each of the following wheels from the manufacturers' numbers.

   a) 32A24-06VBE
   Type of abrasive_____

   Grain_____

   Grade_____

   Structure_____

   Bond_____

PEDESTAL GRINDING ACTIVITIES

I. CHECK NEW GRINDING WHEEL FOR CRACKS

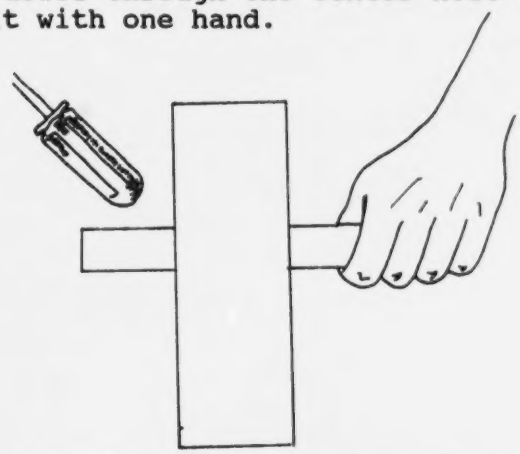
A. Tools and Equipment

1. 1/2" wooden dowel 6" long
2. Plastic handled screw-driver
3. 6" or 8" grinding wheel

B. Procedure

1. Check to make sure the wheel is dry and free of sawdust before testing; otherwise sound may be deadened.
2. Place the dowel through the center hole of the wheel and hold it with one hand.

FIGURE 12



3. Grasp the blade of the screwdriver in the other hand.
4. Tap the wheel lightly with the screwdriver handle and listen for a ring. A cracked wheel will not ring clear.

   (NOTE: Vitrified or silicate wheels will have a clear metallic ring. Organic bonded wheels have a duller ring.)

II. REPLACE GRINDING WHEEL

A. Tools and equipment

1. New grinding wheel of correct size and composition

2. Wrench to fit spindle nut

3. Wrenches to fit tool rest and spark breaker

4. Piece of wood 3/4" x 2" x 12" (oak preferred)

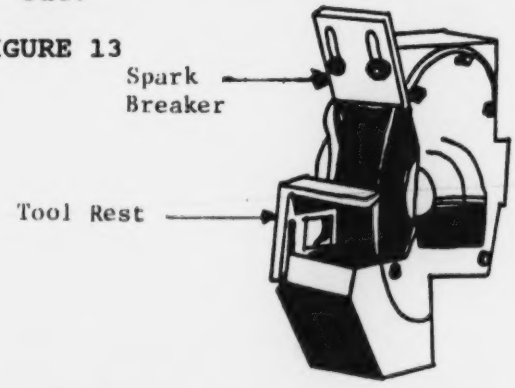
5. Screwdriver (standard point)

6. Wire brush

B. Procedure

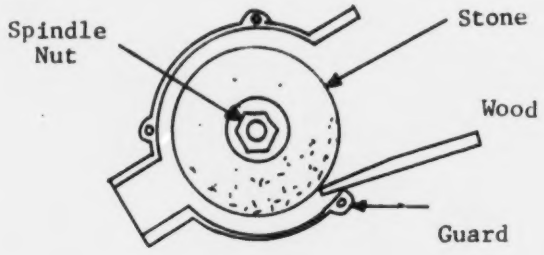
1. Remove the side cover by removing the screws on the side, and adjusting the tool rest and spark breaker out.

FIGURE 13



2. Insert the piece of wood between the wheel and wheel guard to hold the wheel so spindle nut can be loosened.

FIGURE 14

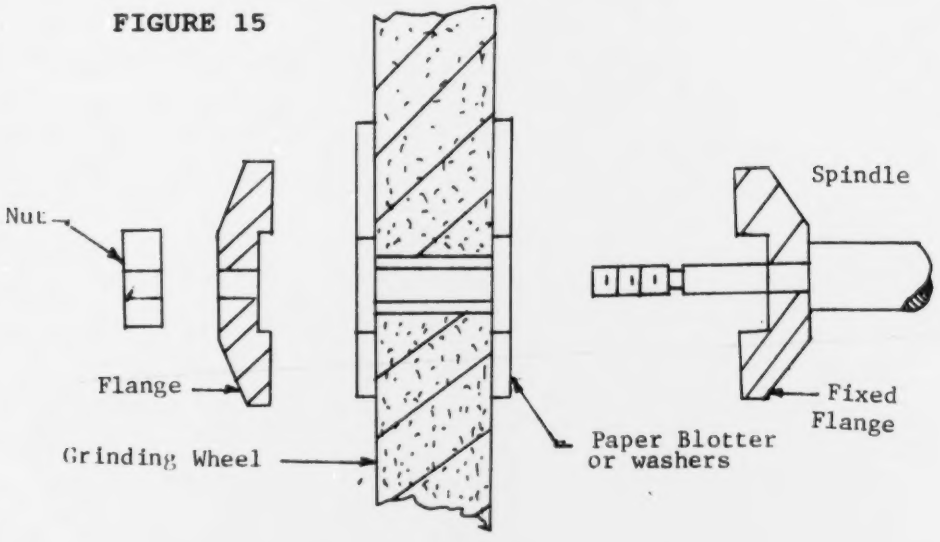


3. Loosen the spindle nut.

4. Remove the flange.

5. Slide the wheel off the spindle.

FIGURE 15



6. Remove the plastic spindle adapter.

   (NOTE: The grinding wheel may or may not have a plastic adapter. The need for the adapter depends on the manufactured hole size of the grinding wheel.)

7. Clean out guard with wire brush and wipe off spindle and fixed flange with a clean rag.

8. Put new grinding wheel (that has already been tested for cracks) on the spindle.

9. Replace flange and secure with nut.

10. Use board to hold wheel and tighten nut.

    (CAUTION: Do not over-tighten as it can crack the grinding wheel. Tighten it enough to keep it from slipping.)

11. Replace the side cover.

12. Adjust the tool rest and spark breaker, rotating the wheel by hand to make sure it is not out-of-round so much it will hit the tool rest or spark breaker.

(NOTE: The new grinding wheel needs to be trued before it is used.)

III. Dress Grinding

A. Tools and equipment

1. Pedestal grinder

2. Desmond Huntington dresser of the correct size for the wheel you are dressing.

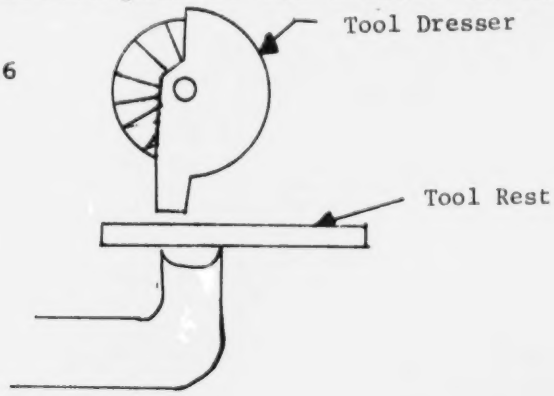
(NOTE: Wheel diameters 3" to 10" should be dressed with a number zero [#0] dresser.)

3. Face shield or goggles

B. Procedure

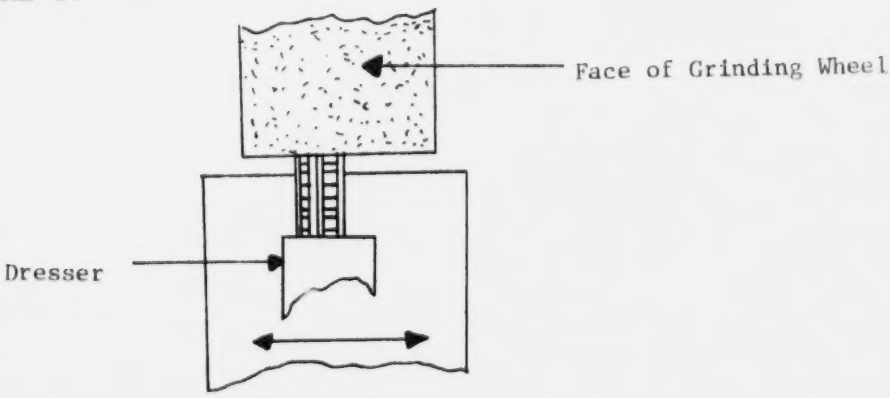
1. Set the bottom pads of the dresser on the tool rest.

FIGURE 16



2. Slide the dresser into the grinding wheel until there are no sparks; then move the dresser across the face of the grinding wheel.

FIGURE 17



3. Continue this procedure until the wheel has a smooth, sharp flat face.

IV. GRIND HIGH-SPEED TOOL BIT

A. Tools and equipment

1. Pedestal grinder with water tray

(NOTE: If grinder has no water tray, place container of water near grinder.)

2. One high-speed steel tool blank

3. Goggles or face shield

4. Tool dresser

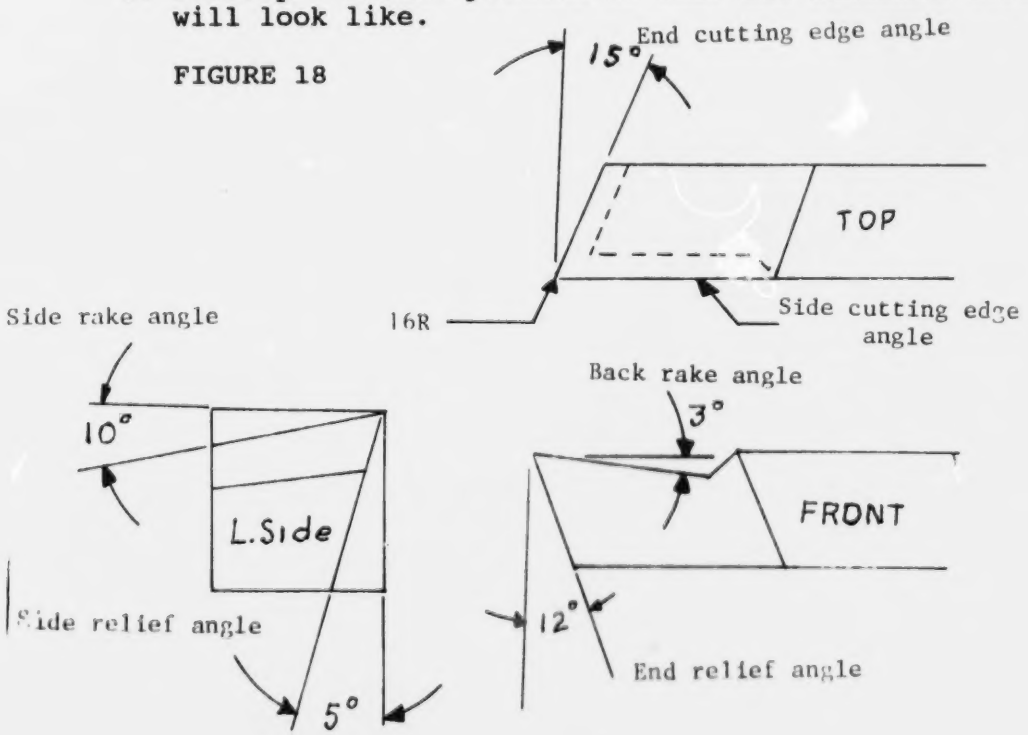
5. Sample tool bit

6. 2 pieces of 3/8" square key stock

B. Procedure

1. Develop a mental picture of what the finished tool will look like.

FIGURE 18

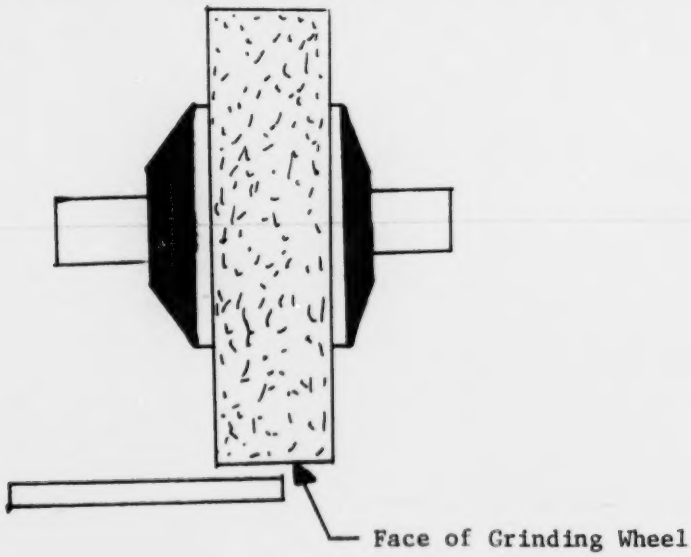


(NOTE: Depending on the type of tool holder, the end relief angle will vary.)

2. Hold the tool bit firmly while supporting hands on the tool rest.

3. Turn the tool so the side is parallel to the face of the wheel.

FIGURE 19

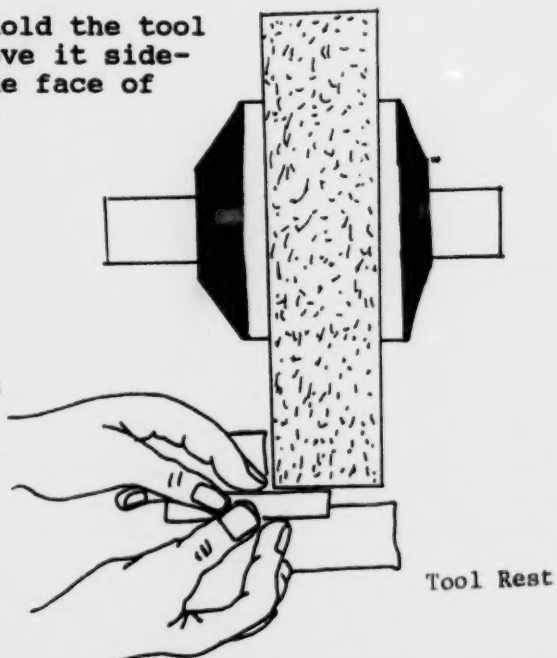


4. Tilt the bottom of the tool bit toward the wheel at 5° for the side clearance angle.

5. Move the work in contact with the face of the wheel.

(NOTE: Do not hold the tool in one spot; move it sideways to keep the face of the wheel flat.

FIGURE 20



(CAUTION: Do not apply too much pressure; if the tool slips off the wheel it could run a finger into the wheel, causing injury.)

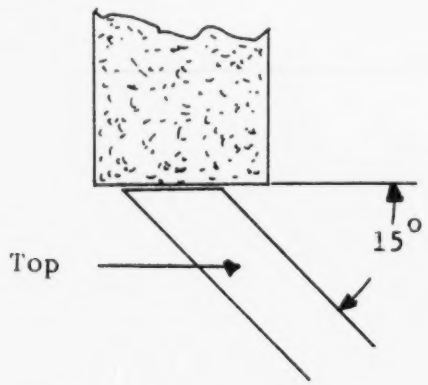
6. Cool the tool frequently during grinding by quenching in water tray.

   (NOTE: Carbide tools should never be quenched.)

7. Grind the curing edge and end relief angles at the same time.

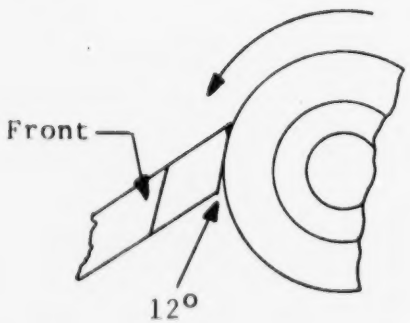
8. Turn the tool so the end is at a 15° angle and tilt the tool back 12° for front clearance.

FIGURE 21



End cutting edge angle

FIGURE 22



End relief angle

9. Hold the tool at approximately 45° to the axis of the wheel and grind the side rake angle to approximately 10°.

FIGURE 23

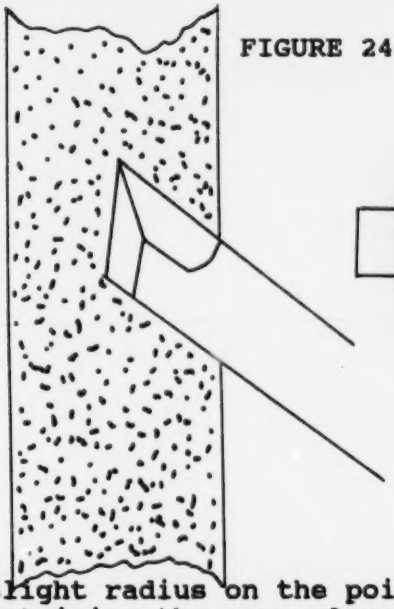
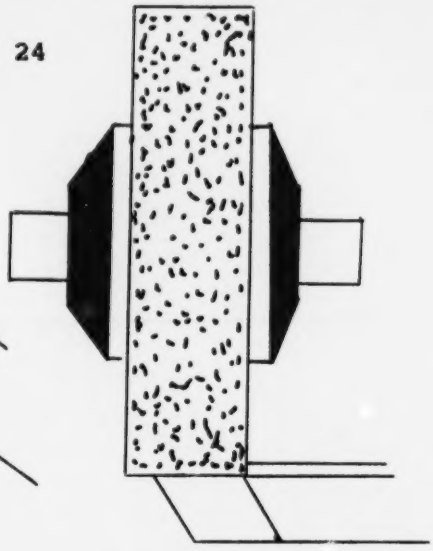


FIGURE 24



10. Grind a slight radius on the point of the cutting tool, maintaining the same clearances with the radius and front and side clearance angles.

FIGURE 25

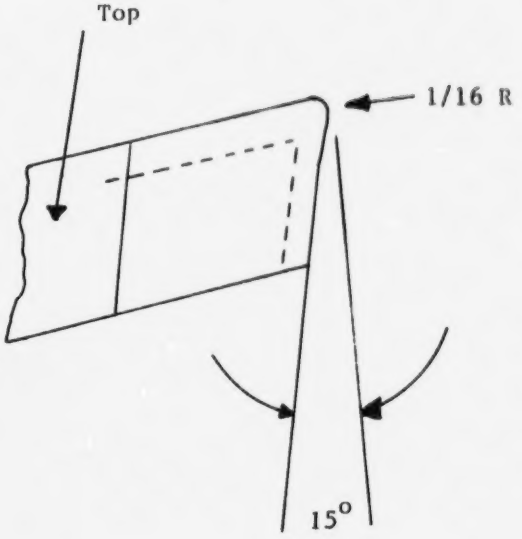
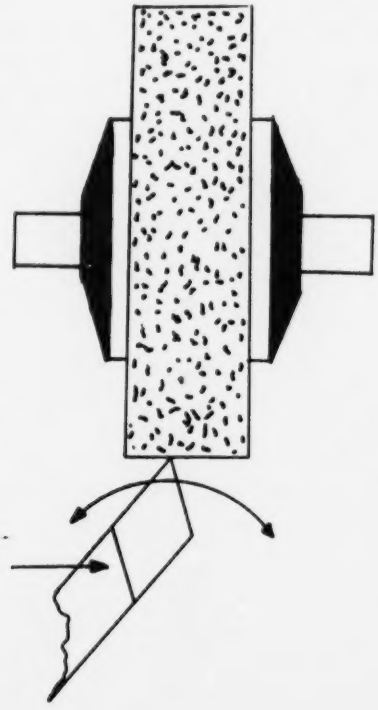
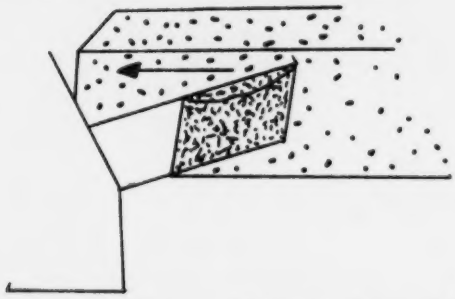


FIGURE 26



11. Hone the cutting edge of the tool bit.

FIGURE 27



12. Dress the wheel to expose sharp, new cutting particles.

13. Clean the area of grinding dust when work on the grinder is complete.

(NOTE: Carbide may be ground on a pedestal grinder if a silicon carbide grinding wheel is used. Never grind carbide on an aluminum oxide wheel.)

V. GRIND DRILL BIT

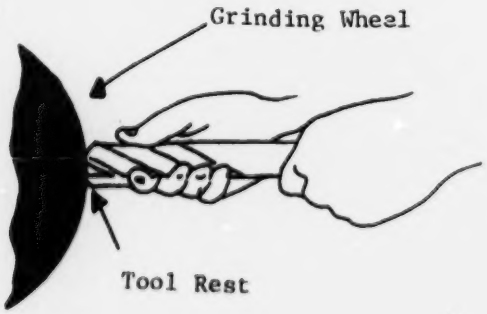
A. Tools and equipment

1. Drill point gage
2. Drill to sharpen (size 3/8" to 3/4")
3. Pedestal grinder
4. Face shield or goggles
5. Grinding wheel dresser

B. Procedure

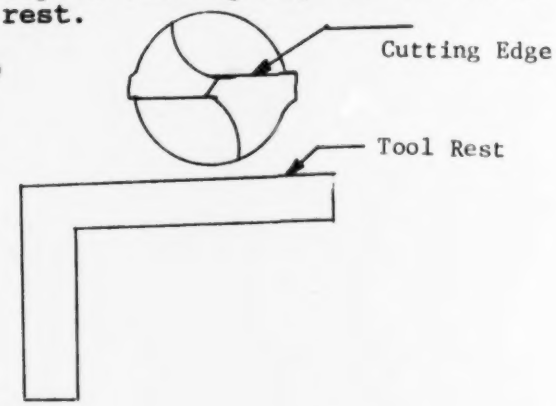
1. Dress the grinding wheel
2. Hold the drill near the point with one hand, and put the other hand on the shank.

FIGURE 28



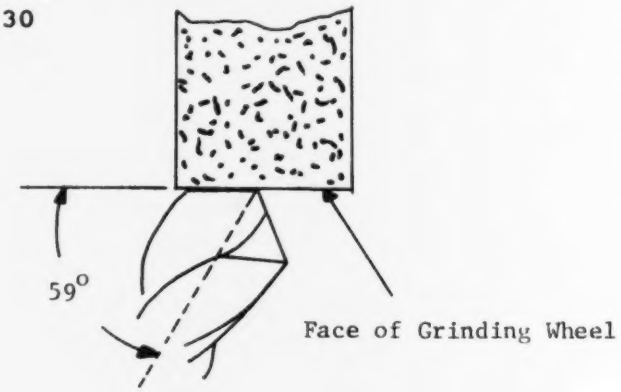
3. Hold the lip on cutting edge of the drill parallel to the tool rest.

FIGURE 29



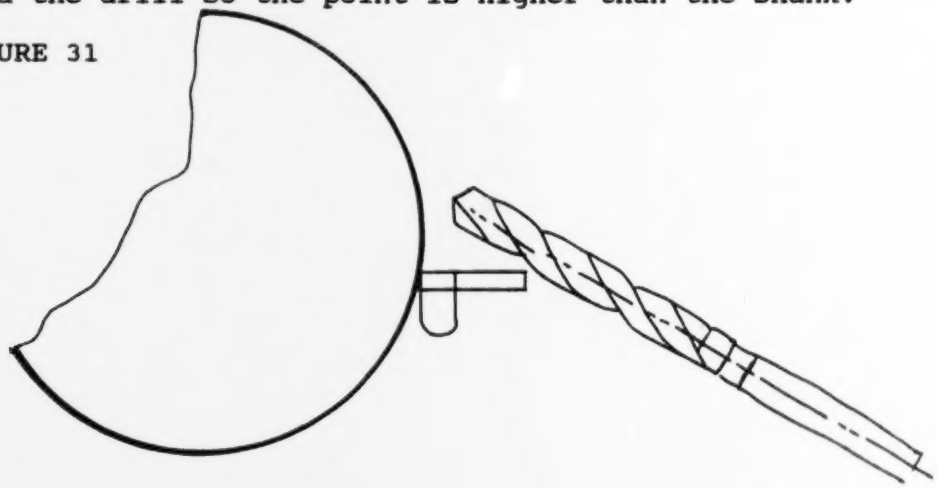
4. Turn the drill until it is approximately 59° to the face of the grinding wheel.

FIGURE 30



5. Hold the drill so the point is higher than the shank.

FIGURE 31



6. Bring the lip of the drill against the wheel and lower the shank.

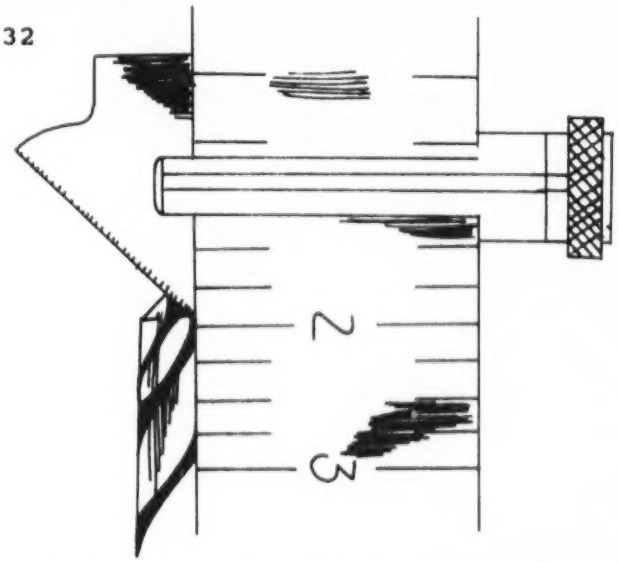
   (NOTE: Do not twist the drill.)

7. Pull the drill away from the wheel and rotate the drill one-half turn.

8. Grind the other lip in the same manner as above.

9. Check the angle and cutting lip length by using a drill point gage.

FIGURE 32

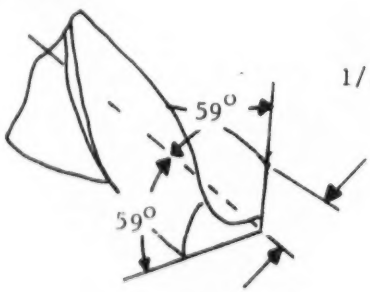


10. Repeat operations 4 through 9 until the angles are correct.

11. When the drill is ground correctly, all these conditions will be present.

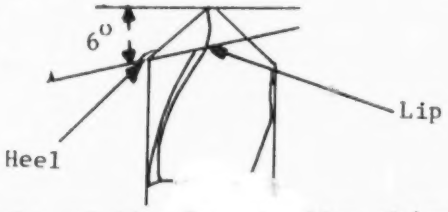
    a. The drill will have a 59° angle per side or a 118° included angle.

FIGURE 33



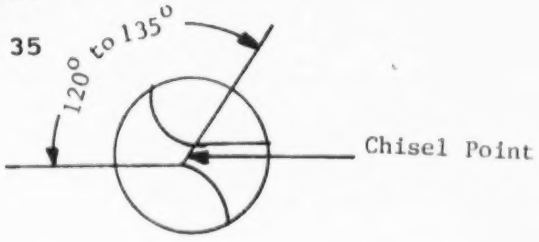
b. The drill will have a heel clearance angle of 6° to 9°.

FIGURE 34



c. The angle of the lip on the chisel point will be from 120° to 135° depending on the heel clearance angle.

FIGURE 35



12. Clean up work area, put tools in proper place, and take drill to instructor for evaluation.

(NOTE: If a drill bit is not ground properly, it will not drill a hole of the correct size, or it may not drill a hole at all. Soon the bit will be ruined because too much pressure will be needed to operate it.)

PEDESTAL GRINDERS - Answers to Questions

1. If a space occurs between the wheel and the tool rest, the tool that is being ground could get caught and jam the wheel causing damage to the wheel, the tool, or the grinder.

2. To identify whether or not a grinding wheel is safe to run. A clear ring indicates that there are no cracks.

3. The wheel gets its strength from the outside to the center of the wheel. When the side is ground, the strength of the wheel is weakened.

4. It should be dressed with a wheel dresser which removes metal that is lodged and it also sharpens the wheel.

5. Non-ferrous materials such as: brass, aluminum, copper, and wood.

6. They can be dipped into a container of cool water.

7. a. Material in the grinding wheel that acts as the curing agent, designated with numbers and letters with the letters identifying the main base.

   b. Size of the abrasive, expressed as a number from 10 (coarse) to 600 (very fine).

   c. The strength of the bond holding the wheel abrasive together determines the rate at which the wheel will break down. This is designated by letters from A (soft) to Z (hard).

   d. The grain spacing - designated by numbers 1 to 12. The higher the number the more "open" the structure.

   e. The material that holds the abrasive together, designated by a letter or letters.

8. Type of abrasive is alundum or aluminum oxide.
   Grain size is coarse (24).
   Grade is medium (0).
   Structure is medium (6).
   Bond is vitrified, resinoid, shellac.